(P 122) Development of Novel Carrageenan Scaffolds for Tissue Engineering using Rapid Prototyping

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In the Tissue Engineering (TE) field, great attention has been given devoted to the use of rapid prototyping (RP). The combined use of Computer Assisted Design (CAD) with advanced RP techniques enables the design and fabrication in a reproducible way of patient adapted scaffolds featuring complex 3D architectures. In this context, Carrageenan is a natural polymer that exhibits a very high biomedical potential. Carrageenan is a sulphated hydrocolloid capable of forming hydrogels with very different behaviours and properties depending on the experimental conditions.

In this preliminary work, novel 3D porous structures of carrageenan were for the first time prepared using RP, by using a 3D bioplotting (Bioplotter®). The study aimed to establish a relationship between the scaffold architectural and crosslinking parameters and the subsequent physicochemical properties. In this perspective, the conjugation of diverse architectural arrangements and post-processing methods, including chemical crosslinking techniques, were explored in order to obtain a diverse range of scaffold architectures.

The properties of the developed scaffolds were assessed by both dynamic and quasi-static characterization tools. The relationships between mechanical properties and architectural parameters and

degree/type of crosslinking were established. Furthermore, cytotoxicity testing using fibroblasts (L929) and direct contact assays using osteoblast-like cells (SaOs-2) were performed in order to assess the effect of crosslinking on cell behavior. Preliminary results confirm the potential of carrageenan scaffolds to be used in bone TE.